

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 January 2002 (31.01.2002)

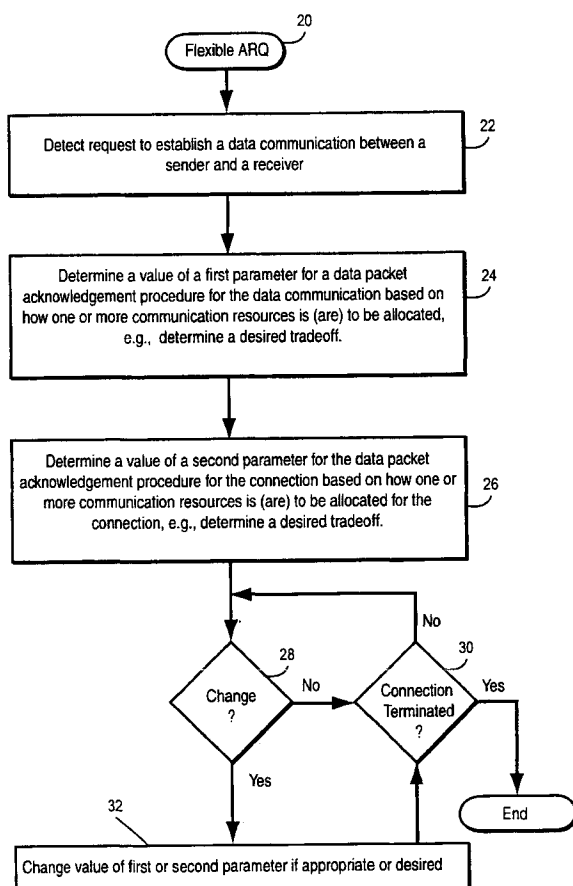
PCT

(10) International Publication Number
WO 02/09342 A3

- (51) International Patent Classification⁷: **H04L 1/18**
- (21) International Application Number: **PCT/SE01/01678**
- (22) International Filing Date: **24 July 2001 (24.07.2001)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
09/621,672 **24 July 2000 (24.07.2000)** **US**
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: FLEXIBLE ARQ FOR PACKET DATA TRANSMISSION



(57) Abstract: The present invention provides a flexible ARQ scheme. A communications channels is set up between a transmitter and a receiver. A value is selected for an ARQ parameter for data packets to be transmitted over the communications channel. The ARQ parameter value may be selected in accordance with a trade-off between a desired performance or goal, e.g., a specific throughput of data packets transmitted over the communications channel, and one or more communication resources required to support the desired performance or goal. An example of an ARQ parameter is a number of outstanding data packets to be acknowledged by the receiver before more packets can be sent to the receiver. Another parameter example is a delay associated with the ARQ scheme. In a preferred, non-limiting example embodiment, first and second ARQ parameter values are selected for a desired trade-off. Accordingly, a specific number of outstanding data packets to be acknowledged by the receiver and an acknowledgement or retransmission delay can be selected to achieve a desired performance, e.g., a desired throughput of data packets, at a particular resource cost. Because of the flexibility provided by the present invention, a communications device may set its own objectives for a particular connection based upon one or more performance requirements, communication resources, or other requirements.

WO 02/09342 A3



Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

25 April 2002

INTERNATIONAL SEARCH REPORT

International Application No

PC, SE 01/01678

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L1/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, INSPEC, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 36150 A (NOKIA TELECOMMUNICATIONS) 14 November 1996 (1996-11-14)	1-9, 24-26, 28-40, 44-48
Y	page 5, line 8 - line 26; claims 1-5	10-23, 27, 41-43, 49,50

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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

15 January 2002

Date of mailing of the international search report

01.03.2002

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INTERNATIONAL SEARCH REPORT

International Application No

PC./SE 01/01678

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BIN FAN ET AL: "Adaptive timer selective repeat ARQ protocol for dynamic satellite constellations with intersatellite links" 1999 IEEE 49TH VEHICULAR TECHNOLOGY CONFERENCE, vol. 3, 16 - 20 May 1999, pages 2174-2178, XP002902250 Houston, Texas, USA ISBN: 0-7803-5565-2 paragraphs [0002],[0003] ---	10-23, 27, 41-43, 49,50
X	US 4 841 526 A (WILSON JON C ET AL) 20 June 1989 (1989-06-20) column 3, line 38 - line 59 abstract ---	1-9, 24-26, 28-40, 44-48
X	US 5 701 311 A (KAPOOR VIJAY) 23 December 1997 (1997-12-23) column 3, line 21 - line 44 ---	1-9, 24-26, 28-40, 44-48
A	US 5 063 562 A (CHEN MON-SONG ET AL) 5 November 1991 (1991-11-05) column 4, line 19 - line 39 column 5, line 52 -column 6, line 30 abstract ---	1-9, 24-26, 28-40, 44-48
A	US 5 974 028 A (RAMAKRISHNAN KADANGODE K) 26 October 1999 (1999-10-26) column 1, line 64 -column 2, line 29 ---	1-9, 24-26, 28-40, 44-48
A	ILL-WOO LEE ET AL: "A study on the performance analysis of error control algorithms in digital cellular DS/CDMA systems" IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS, vol. 2, 1 - 5 May 1994, pages 908-912, XP002902251 New Orleans, LA, USA ICC'94, SUPERCOMM/ICC'94, Conference Record "Serving Humanity Through Communications" paragraph [3.2.1] --- -/--	1-9, 24-26, 28-40, 44-48

INTERNATIONAL SEARCH REPORT

International Application No

PC./SE 01/01678

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 6 205 498 B1 (HABUSHA URI ET AL) 20 March 2001 (2001-03-20) column 9, line 58 -column 10, line 30; claim 12	1-9, 24-26, 28-40, 44-48
P,X	--- WO 00 57594 A (ERICSSON TELEFON AB L M) 28 September 2000 (2000-09-28) page 17, line 4 - line 14 -----	1-9, 24-26, 28-40, 44-48

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/SE 01/01678

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9636150	A	14-11-1996	FI 98023 B AU 707904 B2 AU 5650296 A CA 2220426 A1 CN 1183870 A EP 0826280 A1 WO 9636150 A1 JP 11505084 T	13-12-1996 22-07-1999 29-11-1996 14-11-1996 03-06-1998 04-03-1998 14-11-1996 11-05-1999
US 4841526	A	20-06-1989	EP 0162478 A2	27-11-1985
US 5701311	A	23-12-1997	NONE	
US 5063562	A	05-11-1991	DE 69126640 D1 DE 69126640 T2 EP 0458033 A2 JP 2783469 B2 JP 7074780 A	31-07-1997 08-01-1998 27-11-1991 06-08-1998 17-03-1995
US 5974028	A	26-10-1999	WO 9837670 A1	27-08-1998
US 6205498	B1	20-03-2001	NONE	
WO 0057594	A	28-09-2000	AU 4154200 A EP 1161810 A1 WO 0057594 A1	09-10-2000 12-12-2001 28-09-2000